

WHAT IS CLAIMED IS:

1. A method of forming a reaction product from a liquid comprising:

5 (a) flowing a liquid containing a reactant into a ceramic honeycomb having an inlet end and outlet end connected by adjacent channels that extend from the inlet end to the outlet end of the ceramic honeycomb, the channels being defined by a plurality of interlaced thin porous
10 partition walls having a catalyst thereon wherein the porosity of the partition walls are such that the liquid containing the reactant substantially penetrates into the walls and the reactant reacts as the liquid containing the reactant flows from the inlet end to the outlet end of the
15 monolithic ceramic honeycomb; and

(b) collecting the reaction product from the outlet end of the ceramic honeycomb.

2. The method of Claim 1, wherein the monolithic ceramic honeycomb has a porosity of at least about 50% and a
20 mean pore size that is at least about 5 micrometers.

3. The method of Claim 1, wherein the liquid containing the reactant penetrates in an amount that is at least 10% of a static liquid fraction as determined using the resident time distribution obtained under Taylor flow of a
25 tracer pulsed into the liquid.

4. The method of Claim 3 wherein the amount is at least about 15% of the static liquid fraction.

5. The method of Claim 4, wherein the method has a mass exchange as calculated using an E-curve that is at
30 least about 0.4.

6. The method of Claim 5, wherein the mass exchange is at least about 0.7.

7. The method of Claim 6, wherein the static liquid fraction is at least about 1.25.

5 8. The method of Claim 1, wherein the catalyst is comprised of an enzyme.

9. The method of Claim 1, wherein the catalyst is comprised of a precious metal, base metal or combination thereof.

10 10. The method of Claim 1, wherein at least one of the reactants is introduced as a gas.

11. The method of Claim 1, wherein at least one of the reactants is a gas in a bubble flowing concurrently with the liquid.

15 12. The method of Claim 1, wherein the liquid is comprised of solvent having a dissolved reactant therein.

13. The method of Claim 12, wherein the solvent is water.

20 14. The method of Claim 1, wherein the monolithic ceramic honeycomb is an acicular ceramic.

15. The method of Claim 1, wherein the acicular ceramic has a mean pore size of at least about 3 micrometers and an aspect ratio of at least about 2.

25 16. The method of Claim 15, wherein the acicular ceramic has a mean pore size of at least about 5 micrometers.

17. The method of Claim 15, wherein the acicular ceramic is acicular mullite.

18. The method of Claim 1, wherein the catalyst is comprised of carbon.

19. The method of Claim 18, wherein the carbon is carbon fibers.

20. The method of Claim 19, wherein the catalyst is further comprised of an enzyme.